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# Effect of oryzalin on root ultrastructure and respiration in various wheat cultivars subjected to cold hardening

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## Abstract

The effect of anti-microtubular herbicide oryzalin (10 μ, 2-4 days) on the root ultrastructure and respiration in two cultivars of winter wheat (Triticum aestivum L.) contrasting in their frost-tolerance was studied during plant cold hardening (3°0C, 3 days). The sensitivity of subcellular structures to oryzalin depended closely on cell metabolic activity and the extent of development of the cortical microtubule (MT) network. Most pronounced oryzalin-induced changes were related to enhanced cell vacuolation and the appearance of some signs of apoptosis (as judged from cytoplasm fragmentation) in some cells. In the root zone examined, cell heterogeneity increased, when, along with normally functioning cells, dramatically damaged and even completely destroyed cells appeared. Simultaneously, the activity of cyanide-resistant nonphosphorylating respiration pathway was activated, especially during cold hardening. In hardened cells, single cortical microtubules appeared in both wheat cultivars; this fact indicates that new cold-resistant subpopulations of MT were resistant to depolymerizing action of oryzalin.


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## Keywords

Anti-microtubular agent oryzalin, Apoptosis, Cell ultrastructure, Cold hardening, Respiration, Triticum aestivum